

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Previously Presented): A semiconductor device comprising:

a semiconductor substrate;

an active element structure formed on the semiconductor substrate;

a first insulating film provided above the semiconductor substrate;

a first interconnect layer provided in a surface of the first insulating film and composed of copper;

a second insulating film provided on the first insulating film;

a connection hole formed in the second insulating film and having a bottom connected to the first interconnect layer;

a connection plug composed of a single crystal of copper filling the connection hole so that no other crystals of copper are provided in the connection hole;

an interconnect trench formed in a surface of the second insulating film and having a bottom connected to the connection hole; and

a second interconnect layer provided in the interconnect trench and composed of a polycrystalline metal.

Claim 2 (Original): The device according to claim 1, further comprising a diffusion preventing metal film extending from a bottom of the connection hole to a side wall of the connection hole and an inner surface of the interconnect trench and composed of a material selected from a group consisting of Ti, W, Ta, Nb, Al, V, Zr, Ni, and their nitrides and oxides, the diffusion preventing film having a thickness of 0.1 to 1 nm.

Claim 3 (Original): The device according to claim 1, further comprising a diffusion preventing metal film provided on a inner surface of the connection hole and having an opening reaching the first interconnect layer at the bottom of the connection hole, the diffusion preventing metal film being composed of a material different from copper.

Claim 4 (Original): The device according to claim 3, wherein the diffusion preventing metal film is composed of a material selected from a group consisting of Ti, W, Ta, Nb, Al, V, Zr, Ni, and their nitrides and oxides.

Claim 5 (Original): The device according to claim 1, wherein the copper of the connection plug has the same crystal orientation as that in a part of the first interconnect layer which is located immediately below and close to the connection hole in the first interconnect layer.

Claim 6 (Original): The device according to claim 3, wherein the copper of the connection plug has the same crystal orientation as that in a part of the first interconnect layer which is located immediately below and close to the connection hole in the first interconnect layer.

Claim 7 (Previously Presented): A method of manufacturing a semiconductor device comprising:

forming an active element structure on the semiconductor substrate;
forming a first insulating film above the semiconductor substrate;
forming an interconnect layer composed of copper in a surface of the first insulating film;

forming a second insulating film on the first insulating film;

forming a connection hole and an interconnect trench in the second insulating film,
the connection hole having a bottom connected to the interconnect layer, the interconnect
trench having a bottom connected to the connection hole;

filling the connection hole with a single crystal of copper formed on the interconnect
layer by epitaxial growth so as not to form any other crystals of copper in the connection
hole; and

filling the interconnect trench with polycrystalline copper.

Claim 8 (Original): The method according to claim 7, further comprising:

after forming the connection hole and before filling the connection hole,

forming a diffusion preventing metal film covering inner surfaces of the connection
hole and interconnect trench and composed of a material selected from a group consisting of
Ti, W, Ta, Nb, Al, V, Zr, Ni, and their nitrides and oxides, the diffusion preventing film
having a thickness of 0.1 to 1 nm; and

forming a base film composed of copper, on the diffusion preventing metal film.

Claim 9 (Original): The method according to claim 8, wherein filling the connection
hole includes forming the copper by an electroplating method using the base film as a base.

Claim 10 (Original): The method according to claim 7, wherein filling the connection
hole includes:

forming a base film composed of copper, on the interconnect layer at the bottom of
the connection hole; and

forming the copper by an electroplating method using the base film as a base.

Claim 11 (Original): The method according to claim 7, wherein filling the connection hole includes forming the copper by an electroless plating method using the interconnect layer as a base.

Claim 12 (Original): The method according to claim 7, further comprising:
after forming the connection hole and before filling the connection hole,
forming a diffusion preventing metal film covering inner surfaces of the connection hole and interconnect trench and composed of a material different from copper; and
removing the diffusion preventing metal film from the bottom of the connection hole.

Claim 13 (Original): The method according to claim 7, wherein filling the connection hole includes:

forming a diffusion preventing metal film at the bottom of the connection hole, the diffusion preventing metal film being composed of a material different from copper;
forming a base film composed of copper, on the diffusion preventing metal film; and
forming the copper by an electroless plating method using the base film as a base.